Nivong Sipaseuth 2009: Site-specific Nutrient Management of Maize in Selected Soils of Thailand and Lao People's Democratic Republic.
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Maize (*Zea mays* L.) production in Thailand and in the Lao PDR is limited by many similar factors, such as the low nutrient contents in the soils, soil loss and runoff, and acidic soils (in the Lao PDR). These important problems must be solved in order to establish an appropriate technology for improving maize production. Site-specific nutrient management (SSNM) is an approach needed to increase fertilizer efficiency which emphasis on N fertilizer to increase maize yields in different soil types of the maize producing area of Thailand and Lao PDR.

This study consists of 6 experiments. 1) A laboratory study of the effect of wetting on nitrogen (N) mineralization potential in 6 soil series (Cd, Lb, Ln, Tk, Pc, and Wn) from Thailand, and 4 soils from Lao PDR (Bc, Km, Sd, St). Incubation study soils were treated at three different moisture levels, including air-dried soil, soil maintained at field capacity, and soil heated at a temperature of 40^{o}C for 24 hours. The soils were incubated at 30 ^{o}C for 0 to 70 days. N release of Cd, Tk, Lb and Ln soils tended to produce NO_3^--N rather than NH_4^+-N. The Pc, Wn, Bc, Km, Sd and St soils were high NH_4^+-N released at the initial stage of incubation, and NO_3^--N was increasingly released from 3 to 70 days. The NO_3^--N release was mainly affected by OC content, while NH_4^+-N release was affected by soil pH. Drying the soils resulted in higher NH_4^+-N and NO_3^--N released. High soils amino acid-N and amino sugar-N revealed high N mineralization. 2) The field study of the distribution of nitrate in the Lb and Pc soil series before and after maize planting. Field experiments were conducted in these soil series, which are the most representative soils of the maize producing region of Thailand. Subsoil NO_3^--N was measured before and after maize was grown. Subsoil NO_3^--N levels at the two sites increased with increasing N rate. Before maize was planted maximum levels of NO_3^--N were found at the 20-40 cm and 0-20 cm depths of Lb and Pc soils, respectively. Subsoil NO_3^--N declined at both sites after maize was more than 40 days old. 3) Measuring the amount of nitrate in the Lb and Pc soil series in maize fields under heavy rain. NO_3^--N status was assessed after heavy rains occurred were measured. Nitrate-N status was not significantly different between different depths; however, the maximum NO_3^--N levels in Lb and Pc soils were found at 40-60 cm and 20-40 cm depths, respectively. 4) A field study of maize root distribution at different stages of maize growth in the Lb and Pc soil series. Maize roots distributions were measured at 20, 40 and 60 days after emergence using pin board method. Maize roots were more voluminous in the 49-62 cm and 43-50 cm depths for the Lb and Pc soils; roots clearly grew into the soil zones where NO_3^--N was high. It is probable that N availability from subsoil NO_3^--N diminished the fertilizer N requirement of maize. 5) Determining the N status of maize leaves in the field using leaf color chart (LCC) in the Lb and Pc soil series. Field experiment was also conducted in Lb and Pc soil series. Maize leaf measurement was taken using LCC at 21, 30, 42, 50, 58 and 65 days after maize emerging. Leaf samples were collected for N determination. The leaf color level of maize in Lb and Pc soils was higher than the leaf color level (<3.5) and N symptom deficiency was not appeared on the maize grown on both soils. The use of leaf color chart for predicted N deficient symptom is does not work in the case of Lb and Pc soils because the soils are reached in subsoil nitrate status due to crop rotation with legume. 6) A field study on the nitrogen fertilizer response simulated from DSSAT software on some important maize soils in Thailand, and in the Lao PDR. Field experiments were conducted in the Lop Buri and Pak Chong soil series in Thailand and the other two were Saythong and Bachieng soils in the Lao PDR. Grain yields of maize grown on St and Bc soil series were increased with higher rate of N fertilizer of both years. The response of maize on different rates of nitrogen application in 2005 and 2006 were different. In 2005 maize grain yield of Lb and Pc soil did not respond to N fertilizer. Maize rotated with soybean and chicken manure application in the last season was the cause of no N response on maize. More available N was concentrated in Lb, Pc and Bc soils. With the low soil pH and high Al content in Bc soil led to low yield in both years.

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